The Interspecies Newsletter

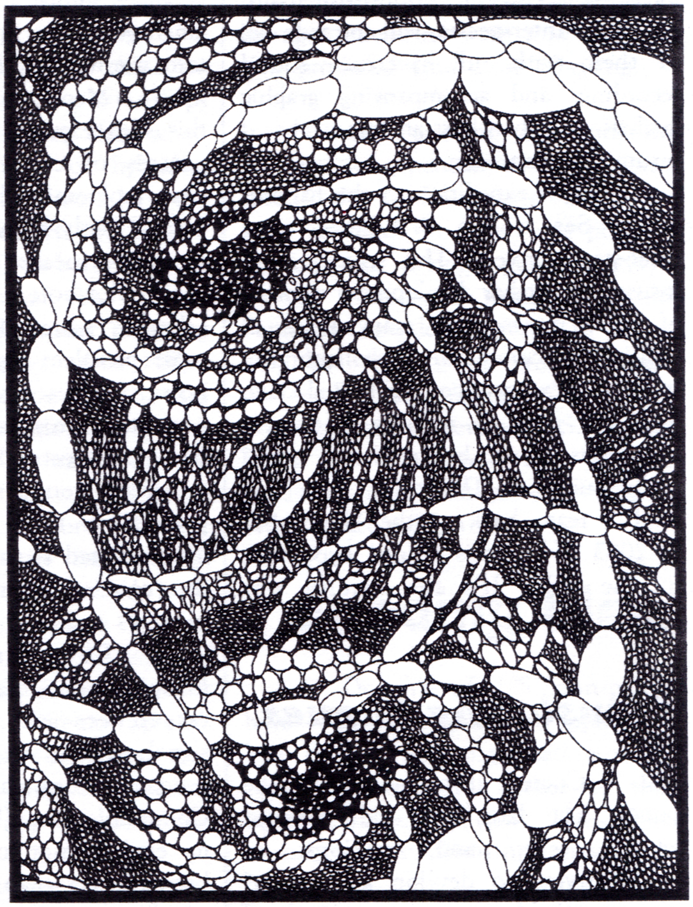
Winter 2002

Published Quarterly by Interspecies Communication Inc.

Communication Science

This newsletter is inspired by my recent attendance of the 14th Biennial Conference on the biology of Marine Mammals held in late November in Vancouver BC. I spent three full days sitting in an exhibitor's booth peddling books and CDs, handing out copies of this Newsletter, and meeting many other biologists and activists around the world who marvel at the mystery of cetacean intellect. What follows is an overview of current communication research with cetaceans. Take your time reading. It's worth it.

—the editor



Using improvizational music to research interspecies communication

Interspecies undertakes an expedition to the Russian White Sea in July 2002 with the objective of recording underwater audio of beluga whales echolocating and vocalizing in a social context. The organization needs to raise at least $8,000 to expedite this next phase of our long term project. Next summer's objective offers a new twist to our ongoing relationship with these whales. We focus less on testing the potential for *interspecies* communication, and more on documenting the mind-boggling processes these whales have evolved to talk among their own kind. As might be expected, our own exploration of whale language offers a radical departure from the controlling techniques developed by cognitive scientists, John Lilly and Lou Herman, whose work focused exclusively on captive animals. To test whale communication among wild animals, we shall often draw on the interactive methods developed over the years by Interspecies Inc. You can read more about these specific procedures, below.

This next expedition will focus on producing a new technical level of field recordings to document the entire beluga whale sonic range of 5 Hz to 160 kHz. To put this wide sonic spectrum into perspective, until just the past year, nearly all scientific research into whale communication was based on recordings made on equipment limited to the human audible spectrum of 20 Hz to 20 kHz. It seems rather self-defeating to realize that acoustic researchers have been trying to make sense of cetacean communication by examining only about 10% of the animals' vocal range.

What's mostly changed in the past year is the gradual evolution of a new generation of inexpensive digital audio tools that permit the full spectrum recording and analysis of sound in a field situation. In this case, "inexpensive" is a relative term, because we still need about $5000 just to purchase the gear. However, two years ago, the cost was much higher, and therefore not accessible to researchers unaffiliated with either the military or big-budget university acoustics departments.

Our task in Russia includes the construction of the sound system, the making of the recordings, and the development of a highly skilled multi-disciplinary network of international specialists to test the best hypotheses offered to explain the difficult, fantastic, often arcane and esoteric nature of whale communication. Over the past year, a diverse group of whale enthusiasts associated with Interspecies, including physicist/activist Rauno Lauhakangas, digital artist Andrew Davelis, technicians Mark Fisher and Joe Olson, and film maker Bob Wood have helped us begin the formidable task of assembling this network, with the result that the number of professional researchers affiliated with Interspecies has grown dramatically to include behavioral biologists, digital audio programmers, soundscape artists, phoneticians, equipment makers, and bio-acousticians from half a dozen countries. All are committed to testing a set of original and sometimes profound theories that confront the basis of cetacean communication. Basically, Interspecies will provide all of them with full spectrum sound recordings and accompanying graphic analysis, and then host an Internet-based forum for discussion.

Our expedition to the Russian White Sea is the first stage of a three-stage project. The second stage focuses on further developing a network of peers representing many fields of inquiry to commence a collaborative study of next summer's collected data, with the goal of refining a testable hypothesis about beluga whale social communication. The third stage will send a team back to the White Sea in 2003 to test this refined hypothesis in the wild. It's the careful way science works.

Translating Fugues

Current hypotheses run the gamut. The late John Lilly devoted several years and millions of dollars trying to develop a "halfway" interspecific language comprised of dolphin whistles and human words. His legion of critics were probably correct in contending that discrete dolphin whistles are not actually words, but something else, perhaps something closer to music, and therefore, attempting to translate dolphin whistles into English is like trying to translate a Bach fugue into English. Nonetheless, Lilly was the foremost pioneer of this field. His research, his speculative writing, and his formidable promotion of both cetacean intellect and soulfulness, has galvanized a new generation to get involved.

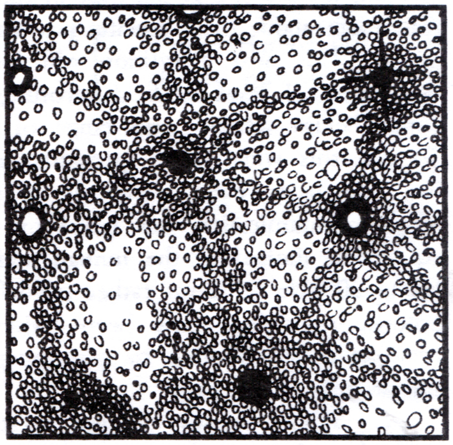
The Russian beluga specialist, Anton Chernetsky, believes that belugas vocalize in discreet phonemes, of which he has already isolated twenty-four. Phonemes comprise the acoustic analogue to the letters of an alphabet, the actual sounds we make to communicate through language. Focusing on phonemes as the building blocks of cetacean communication strongly implies that whales have evolved a language similar in structure to human language, made up of sounds merging into words, and then sentences.

Many researchers suspect that this idea explains only a part of the process of cetacean communication. One problem with focusing on viable parallel with human language, is that cetacean's vocalize their signals through their blowholes not their mouths. Likewise, many of the beluga whale's most prevalent signals resemble white noise, suggesting indiscrete sounds generated across a wide swath of the frequency spectrum. Other sounds seem organized around rhythmical structures, patterns in time, rather than sets of differentiated signals, which contradicts the concise phonemic content that human's utilize.

Canadian biologist Peter Beamish argues that all communication researchers err to emphasize the signals themselves. Beamish offers an unique theory called Rhythm Based Communication (RBC) that attempts to explain not only communication between cetaceans, but between all non-human species. RBC postulates that the actual sounds any animal produces are arbitrary to what is being communicated. In certain instances, animals don't even need to produce audible sounds because, in Beamish's hypothesis there is nothing "para" about the so-called paranormal. Telepathy may be the norm within nature. What does matter is the rhythm or the timing of animal calls.

Beamish offers this stunning example. If whale A makes a sound, followed by a 15 second lapse, then another sound, followed by a 45 second lapse, it will usually prompt whale B (any whale B within earshot) to lift its head above the water. RBC might be comprehended as the bio-acoustic analog to physic's quantum theory, a wildly innovative paradigm offered to explain insurmountable difficulties in understanding whale communication that arise when the problem is confronted through the standadized "Newtonian" lens of signals, phonemes, and halfway languages. Like Lilly's ideas from thirty years ago, Beamish's approach remains universally misunderstood, and discredited among mainstream biologists who possess neither the imagination nor the courage to test it. We plan to do just that.

Cognitive scientist Lou Herman has been studying communication and intellect among captive bottlenose dolphins for twenty years at Kewalo Basin in Hawaii. He focuses on a form of *interspecies* communication, relying on a subset of Ameslan hand signals used by the deaf. While Herman's captive dolphins have learned to perform many complex tasks involving the sophisticated abstract concepts of creativity, improvisation and multiple choice, the promise of language ultimately fall shorts because his method fails to recognize the obvious fact that dolphins don't have hands of their own, and can never participate as peers in the discussion. A more subtle complaint is levied against Herman's persistence to base his language studies on young captive dolphins which have never had the opportunity to learn the communication skills this species obviously uses among its own kind in the wild.



Insisting that animals are not sentient beings

Herman's approach is probably best understood as a sophisticated training program, based on the awarding of food to dolphins who give the correct answers. The Kawalo Basin Project offers a prime example of the anthropocentric attitudes of cognitive science in its insistence that research on captive animals is legitimate as long as the distress it causes increases human knowledge.

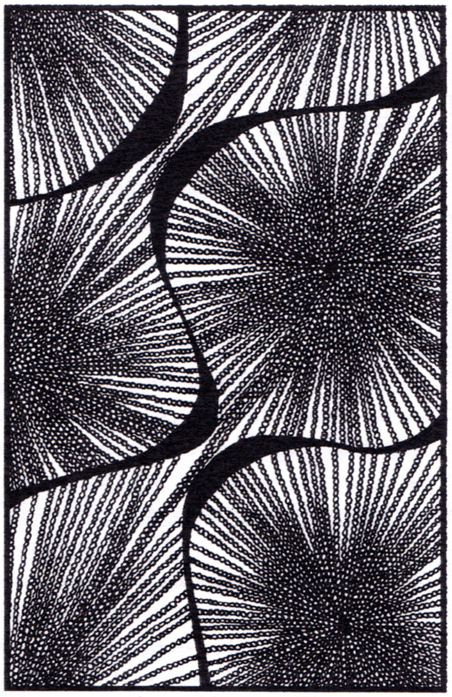
Despite the fact that this long term study precludes any real chance of a dialogue between species, the basic form of focusing on interspecies relations to learn about dolphin language has some merit.

Echoing Perception

Bats and toothed whales use echolocation (or sonar) for perceiving a dark or murky environment. The animal produces streams of clicks that echo off objects, providing a three-dimensional kinetic image of, for instance, its prey, even granting precise information about bone structure, which echoes differently than soft tissue. Scientists agree that whales echolocate to perceive their world.

The communication hypothesis we are most keen to explore next summer has been developed by Interspecies own Jim Nollman, and bio-acousticians Roman Belikov of the Russian Shirshov Institute and Liz von Muggenthaler of the North Carolina-based Fauna Institute. The basic idea is that the common "creaky door" sound produced by several dolphin and whale species is an adaptation of echolocation which has evolved for communication within a social context.

The three researchers postulate that certain species of cetacean are able to retain echoed "pictures" in memory, which they can vocalize to other whales. It can not be overstated that these echoes are not precisely "pictures", but something unique, closer to holograms displaying three-dimensional, X-ray, and kinetic information. Because the original echoes are almost inconceivably dense with information, and because the same echolocation "images" may be altered by such attenuating factors as current, tide, and spatial distance, the actual communication of social echoes may not consist of simply mimicking the original sonar. One plausible idea is that whales encode the dense, overlapping beats of social echolocation, not within phonemes, but within the similarly dense, overlapping pulses of the harmonic progression.



Envisioning a form of Rhythm Based Language

The human ear hears these pulses as timbre, the unique quality that distinguishes an oboe from a flute when both are playing the same note. The fact that the cetacean ear can obviously discriminate exceedingly fast pulses that sound like a single continuous tone to the human ear, and that they perceive a much wider frequency spectrum than humans, suggests that they also perceive the individual harmonic beats that comprise timbre.

These beats are quite easy to graph, and therefore analyze on a computer. Belikov believes that the same immense brainpower that whales use to process echolocation, also allows for the processing of an echoed language.

Scientists agree that a large percentage of the social communication between sperm whales and between beluga whales is based on clicks. In fact, the beluga recordings we produced last summer in Russia sometimes sound like radio static. However, when the static is slowed down electronically, the perceived white noise forms into precise modulating pulses. Observed behavior makes us strongly suspect that these pulses are being utilized in a social situation.

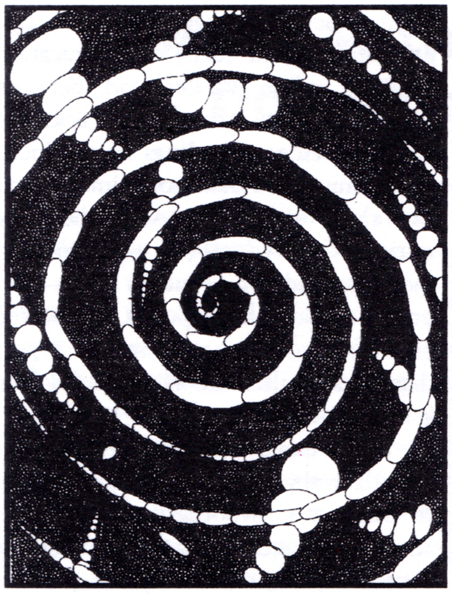
Because echolocation is essentially rhythm-based, we now wonder if Beamish's hypothesis might offer any feasible techniques to discover the content within the temporal patterns of the echoed form.

The Spanish whale researcher, Marcel Andre, has been studying sperm whale vocalizations for several years in the Canary Islands. In a recent paper, he offers clear documentation that the individual whales within his study group usually initiate a communication by vocalizing a highly-syncopated variation of its usual social clicks. Andre has demonstrated that these introductory phrases are the sperm whale's equivalent of the signature whistles that certain other cetaceans use to identify themselves as they start to speak.

One of Andre's assistants is an African drum master who has become the only researcher able to identify, by ear alone, individual whales by their rhythmal signature. By what seems a bizarre process of convergent evolution, the sperm whales signature whistles are nearly identical to the rhythmical patterns developed in West African drum communication.

What is Communication?

Demonstrating communication among wild animals involves several difficult problems that must be solved almost simultaneously. First we have to identify the participants in a dialogue as animal A and Animal B. Then we must decipher what Animal A is



Envisioning the form of Echo Based language

articulating to Animal B. And third, we need to show that Animal B made the anticipated response to the information communicated by Animal A. The problems are daunting when one realizes that these animals live 95% of their lives underwater. That explains why almost no one has ever undertaken the task with wild animals.

That whales vocalize a good deal of the time ultrasonically, not only beyond the range of the human ear, but beyond the standard lot of audio recording tools as well. Another problem involves identifying individuals just by their voices. Biologists have solved this last one by setting up expensive hydrophone arrays that permit triangulation on a sound source. If the whales they are studying happen to be orcas from the visually-identifiable Puget Sound population, it's occasionally possible to match a specific call with a specific surfacing animal. Using that same triangulation with all-white, beluga whales that can not be so easily identified by obvious visual characteristics remains impossible.

To solve the problem, we propose the development of voice printing technology for whales. This operates on the common technology that now allows a person to speak a command to start up his computer in the morning although the same command spoken by somebody else gets no response. It's a trivial miracle, handled by the timbre-graphing mathematics known as *Fast Fourier Transform*. Every individual's timbre, whether human or whale, displays its own unique characteristics which a computer can map and possibly track as well. As long as the timbre remains vaguely constant, we know it's the same whale speaking. If two whales are identified, calling and responding several times in succession, then we know we have a dialogue. Unlike triangulation, we never need to actually see the whales we are identifying.

Studying echolocation as a potential basis for beluga whale language also involves confronting dynamic issues that do not occur in other forms of communication. Knowing the distance between an echolocating whale and the echolocated object is critical because it determines both the frequency and the repetition rate of the click train. Since echolocation is an issue of physics as much as perception, we hope to measure the relationship between distance, pitch, and click rate by documenting how these ratios vary as whales click on an underwater camera we suspend in their domain.

It has also been suggested that we consult with programmers of both submarine sonar and fish finders. We are now gathering information to start this process. One of our colleagues has speculated that one day in some plausible future, we will be able to record echolocating whales and simultaneously watch the sonar get translated into objects on a video screen. Even more science-fiction, is the opposite idea that we someday draw objects on a screen which a computer will translate into a click stream identical to a whale's own echolocation.

Being Animal B

Demonstrating the fundamental aspects of cetacean communication may not prove as technically daunting as this discussion otherwise implies. Framing our challenge in its simplest terms, what we seek initially is clear verification that animal A and B engage in an acoustic call and response, and that this communication between individuals causes a predictable alteration in each other's behavior.

In fact, Interspecies has already developed working methods to test this form of acoustic relationship. The way we do it, a human musician takes on the role of animal B. For one example, hearing an orca vocalize a melodic call anchored in the key of C, a guitarist precisely mimics the call but in the key of D. It is not uncommon that the orca will respond to the guitarist with his call modulated up a whole step to D. Once in a great while, an orca will actually respond in the key of E, suggesting that the initiated communication is not a basis for simple mimicry, but for pattern recognition. In that case, the appropriate response is another whole tone shift.

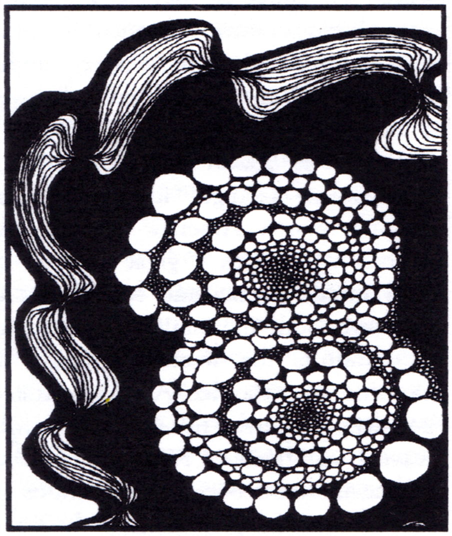
Unfortunately, a guitar can neither mimic a whale's timbre, nor emulate its incredibly wide-band frequency spectrum. But a computer can. The latest generation of software samplers can easily be programmed to mimic a whale's timbre across the varying notes of the chromatic scale, and even modulate its reflected response in any of several logical ways. Last summer in Russia, we started using a Macintosh "virtual sampler" called the EXS24 developed by Emagic, developing new procedures for eliciting a call and response. We tried it again in September with a vast herd of 300 Pacific white Sided dolphins, humpback whales, and orcas off the northern tip of Vancouver island. This sampler based call and response relies on ideas based in everything from game theory to advanced harmony to Indian raga song structures, and even to the wildly eccentric idea of closely emulating whale calls with bird song.

To be continued.

–Jim Nollman, Dec, 2001

Whale Culture

Sixty or more papers were read at the recent Vancouver Marine Mammal Conference, that focused on the many diverse issues of cetacean acoustics. In general terms, behavioral biologists have given notice that they are ready and eager to play around the edges of the communication issue, poking and prodding the amorphous beast, yet without any one of them willing to declare that the signals of certain species comprise an actual language. This lack of confidence seemed as much a semantic problem as a scientific one. While the conference included a well-attended workshop on the paradigm-crunching subject of cetacean culture (abstract below), there was much expected grumbling among the purists that using a word like "culture" to describe aspects of non-human behavior is anthropomorphic. The idea of anthropomorphism thus retains its anachronistic grip on the throng as a career-threatening swear word within professional circles, even though its actual power is constantly being pricked and deflated by a dazzling, emergent vocabulary that has recently entered the whale biologist's lexicon, including matriarchy, lineage, dialect, rhyme, sentience, song, race, culture, and yes, language.



Envisioning the form of human language

The Marine Mammal Society's hosting of a workshop on whale culture seems a profound innovation for any biology conference. Culture implies aesthetics, ethics, spirituality, and a hundred other messy perceptions and non-Darwinian codes of behavior that lurk in the shadows waiting, hopefully, for some future marine mammal conference to announce its entry more firmly into the light.

Abstract:

The Question of Cetacean Culture

by Luke Rendell and Hal Whitehead, department of Biology, Dalhousie U. Halifax Nova Scotia.

Cetaceans learn vocalizations, foraging techniques and social behavior from other cetaceans. This results in similarities in behavior among populations or sub-populations, of whales and dolphins. Such phenomena constitute "culture" by any definition of the term which a) can be applied to non-human animals, and b) does not exclude elements of human culture. The evidence for cetacean culture is strong in some cases (especially the vocal behavior of humpback and killer whales), weaker in others, but stands up well alongside the evidence that has fueled debate over culture in primates. In some respects, cetacean culture s seem to have features unique in non-humans. Why do they have these features, but yet lack the obvious material elements of human culture? We suggest that aspects of the aquatic environment and cetacean biology may have favored the evolution of vocal, social, and foraging cultures, but disfavored technological cultures which are based on the manipulation of materials. For some cetaceans, it seems likely that culture is an important determinant of behavior and fitness. We need to study cetacean culture directly yet this is a challenge. While experimental studies, both in the laboratory and in the wild have an important role in the study of culture in whales and dolphins, the real treasures will be uncovered by long term observational studies at sea using new approaches and technologies. Findings will hopefully feed into the broad debate of what "culture" is and whether animals have it.

John Lilly 1915-2001

He was a longtime friend and mentor to all of us in this organization. The *New York Times* obituary, described him as "a neuroscientist and writer who explored human consciousness, dolphin communication, and the borders of reality with the showmanship of P.T. Barnum and the infectious zeal of Jacques Cousteau."

I think of him smiling through old age, and recall the many times I heard peers and family members plead with him to to take better care of himself. And yet he outlived so many of them. John was a raspy, twinkle-eyed, good old Catholic boy who grew up to become a world famous curmudgeon and psychedelic guru whose enduring research tried to demonstrate that the mind has a life of its own beyond the body. If he was correct, and why not, I fully expect to hear from him again. Otherwise, rest in peace John.

Music with Dolphins

Interspecies often sponsors artists to explore human/animal relations. In support of this objective, we have produced expeditions up to northern Vancouver Island for over 20 years to interact with the wild orcas who reside there. For eight years in a row, we anchored a boat in the same cove, then dropped underwater speakers and hydrophones over the side to transmit live music into the water to try to attract the pods. Over the years, about 200 people participated. And many, many whales.

This basic style of interaction altered after whalewatching commenced in earnest. The whales were suddenly being followed by noisy boats for up to twelve hours a day, making our own quiet, invitational techniques all but impossible to continue. The whales responded to the tourism onslaught by significantly widening the range of their travels, often departing their former core area for days or weeks at a time.

It seems important that Interspecies continue its long relationship with these orcas. For the past three years our forays north have occurred aboard the Shelmar, skippered by Interspecies board member Bob Wood. We have adapted to the new noise levels, as well as to the whale's own widened range, by remaining mobile, interacting with the whales in much briefer intervals, and only when there is a complete lapse in boat traffic. In 1999, Interspecies invited Joe Olson of the American Cetacean Society, and National Public Radio journalist, Liam Moriarty. The 2000 expedition was documented by the CBS news show, *Sixty Minutes*.

During the summer of 2000, the boat traffic hardly ever diminished from sunrise to sunset, so when Sixty Minutes departed, we decided to quit the orcas entirely to explore further north, finally entering the wilderness archipelago that lies between the northern tip of Vancouver Island and the Canadian mainland. There, we encountered a herd of up to five hundred Pacific White-sided dolphins (Lagenorhynchus obliquidens) accompanied by several humpback whales. There were so many large sea mammals about, that the scene reminded us of 19th century illustrations of buffalo on the Great Plains. The dolphins clearly enjoyed swimming beside our moving jet boat (with no propeller to harm them). During that short sidetrip, we shot some video of the dolphins, using an underwater pole camera Bob Wood operated from the surface.

The Shelmar traveled north again in September 2001. This time, it was immediately clear that the orcas had already fled Johnstone Strait for points unknown. We wasted no time heading north, located the herd, and spent four remarkable days surrounded by hundreds of dolphins accompanied by six humpback whales and a throng of Stellar's sea lions.

As many as six dolphins at a time tightly circled the underwater speaker and hydrophone. With no other boats in the vicinity besides an occasional cruise ship rumbling its way to Alaska, the only water noise we had to contend with was the dolphins inadvertently bumping our hydrophone while interacting with the music.

The musical interactions between Jim Nollman's guitar and the dolphins were off the chart, enhanced by the fact that the dolphins vocalized within mere inches of the hydrophone. The most intriguing interaction occurred when the guitarist emulated the "creaky door" echoes by bending his strings a whole tone or more. At first the dolphins responded by mimicking the short phrases, but then initiated a sonic game by improvising melodies grounded in the same "bent" musical scale.

Interspecies hopes to release a CD entitled Interspecies Music, in the spring of 2002. Several of these dolphin interactions will be included. Stay tuned.

Book Reviews

The Eternal Frontier

An Ecological History of North America and It's Peoples.

Tim Flannery, [Atlantic Monthly Press, NYNY 2001]

The book offers a revealing context for such environmental issues of our day as global warming, the destruction of habitat and the mass extinction of species. What the author shows in mind-altering detail is that such acts of violent change have always been the norm rather than the exception in North America. The scene opens with an asteroid plowing into the sea off Yucatan 65 million years ago at such an angle that it destroyed nearly every plant and animal in North America including all the dinosaurs, leaving vast expanses of the continent virtually void of life for hundreds of thousands of years afterward. The mammal species that survived were just lucky enough to live in deep canyons to the far north and west of the continent. Or another example: about thirty million years ago a drought and heat wave struck the continent with such power as to raise the mean annual temperature as much as nine degrees higher than it is today killing off most of the largest animals over a few years time.

The reason for so many fast and violent changes in our climate is that North America is uniquely funnel-shaped with a great expanse of land in the Arctic, and several chains of north-south mountain ranges acting as conduits for weather change. It explains why the Ice Ages penetrated so deeply south in America while leaving vast tracts of Asia ice-free. One of the most discouraging alterations in biome occurred just thirteen thousand years ago, when newly-arriving Asiatic humans invented the Clovis spear tip which permitted them to kill off ALL the Mammoths, mastodons, ground sloth, dire wolves, stag elk, giant beavers, giant armadillos, and short-faced bears, in a brief 600 year blood letting. Sounds like today's news.

...there are forces in the lives of people and animals and plants that have made them what they are. Some are big forces—factors of climate and topography, isolation and landmass size—that exert their power over eons and in the process shapes species and whole environments. Others are more transient and affect populations, communities, and individuals as circumstances change rapidly around them. Ecological historians range far and wide through time and space, rounding up these disparate forces to show the evolution of a particular species or an entire region.

...We are left with the feeble hypothesis that one day [9000 years ago] some farsighted American Indian beachcomber found an African gourd that had floated across the Atlantic Ocean containing viable seeds. She or he then carried it inland and planted it in rich riverine soil which soon gave rise to all the domesticated gourds of the New World. Even more extraordinary is the fact that it would be thousands of years before anyone in the Old World, where gourds abounded, would do the same thing.

...Over the past 2.4 million years, the Earth has flip-flopped in and out of the freezer at least seventeen times. The last freeze, known as 'the last glacial maximum' grew rapidly in intensity 35,000 years ago, peaked 18,000 years ago, and deteriorated from about 15,000 years ago. On land, each ice age tends to obliterate signs of its predecessor, so measuring the severity of the various advances of the ice can be difficult. The sea preserves a better if less accessible record, and its sediments suggest that during the penultimate glacial maximum 150,000 years ago, the sub-Arctic front of the northern oceans stood five degrees closer to the equator than it did 18,000 years ago.

The Botany of Desire

A Plant's-Eye View of the World

Michael Pollan, [Randon House, NY 2001]

We humans tend to think we are in control of our relationships with the plants we grow; that when we cultivate apple trees or hybridize vegetables the plants themselves are basically inanimate objects we choose to achieve our goal, whether it be adding a new color of rose to our garden's pallete, or an earlier maturing eggplant for our dinner table. Pollan writes with great passion, depth, and wisdom that we humans have got it wrong as usual. Lillies might not be mindfully controlling our cultural desire to acquire the perfect bloom (whatever that is), but the species fundamental evolutionary strategy has guided it to alter itself to accommodate human desire. This book looks at the issue of who's in control here, from the point of view of four very different species: the apple, the tulip, marijuana, and the potato. This is a must read for any gardener, any eater, any smoker.

...The Bible never mentions "the fruit of the tree which is in the midst of the garden", and that part of the world is generally too hot for apples, but at least from the Middle Ages northern Europeans have assumed that the forbidden fruit was an apple. (Some scholars think it was a pomegranate.) This mistake strikes me as yet another example of the apple's gift for insinuating itself into every human environment, even, apparently, a biblical one. Like a botanical Zelig, the apple has wormed its way into our image of Eden through the brushwork of Durer and Cranach and countless others. After their pictures, re-creating a promise land anywhere in the new World without an apple tree would have been unthinkable.

...as a certain primate with a gift for experiment and horticulture stumbled on [marijuana's] psychoactive properties, the plant's evolution embarked on a new trajectory, guided from then on by that primate and his desires. The cannabis flowers that gave humans the most pleasure or strongest medicine were now the ones that produced trhe most offspring.

...By "opening and using this product" [of genetically modified potato spuds], the card informed me, I was now "licensed" to grow these potatoes, but only for a single generation..That is, the potatoes I would dig come September would be mine to eat or sell, but their genes would remain the intellectual property of Monsanto, protected under several U.S. Patents. Were I to save even one of these spuds to plant next year, I would be breaking federal law.

Funding Ideas

Donors of US non-profits have two largely untapped options to help their favorite organization remain viable. Email us, if either of these options interest you. They both ensure the continuing survival of Interspecies.

1) **You can add a provision to your will that declares:**

"I give, devise, and bequeath to Interspecies Communication, a non-profit located in the state of Washington, the sum of $__ and/or (specifically described property.)

2) **You can make a direct donation of stock**, earmarked for the Interspecies endowment. Stock donations potentially provide a larger tax deduction than the commensurate cash donation because you claim current market value at the time of transferral.